A COMPARATIVE STUDY OF LAPAROSCOPIC VERSUS OPEN CHOLECYSTECTOMY IN CMCH COIMBATORE

Dissertation submitted in Partial fulfillment
of regulations required for the award of
M.S Degree in General Surgery Branch – I

THE TAMILNADU

DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI – 600 004

September 2006

BONAFIDE CERTIFICATE

This is to certify that the comparative study of

OPEN VS LAPARASCOPIC CHOLECYSTECTOMY

is a bonafide work done by

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for the award of the Degree Branch-1 M.S

(General Surgery) in Dr.MGR Medical University,Chennai.

Unit chief signature

HOD signature

Dean Signature

DECLARATION

This is consolidated report on a comparative study of OPEN VS LAPAROSCOPIC CHOLECYSTECTOMY based on the cases treated at CMCH Coimbatore during the period of 2004 – 2006. This is submitted to THE TAMILADU DR.M.G.R MEDICAL UNIVERSITY CHENNAI in partial fulfillment of rules, regulations of M.S Degree Examination in general surgery to be held on September 2006.

S.JOTHIKUMAR

ACKNOWLEDGEMENT

I wish to express my sincere thanks to my Unit Chief **Dr. G. S. RAMACHANDRAN MS, MNAMS,** of his encouragement and valuable guidance during this study. I am also very much grateful to my professor and Head of the Department **Dr. K. P. ARUN KUMAR** and all Unit Chiefs for their encouragement and teaching for preparing my study.

I wish to express my thanks to our Dean **Dr. T. P. KALA NITHI** for permitting me to use the clinical materials of this hospital for the study.

I am thankful to my all Assistant Surgeons in Surgery Department for their cooperation for this study.

CONTENTS

INTRODUCTION

The modern era of laparoscopic surgery has evoked remarkable changes in approaches to surgical diseases. The trend toward minimal access surgery (MAS) has prompted general surgeons to scrutinize nearly all operations for possible conversion to laparoscopic techniques.

HISTORICAL ASPECTS

The first open cholecystectomy was performed by langenbuch on July 15-1882 in Berlin. The first laparoscopic cholecystectomy was performed by Muhe in 1985. How ever the first laparoscopic cholecystectomy recorded in medical literature was performed in March 1987 by Mouret in Lyon, France. The technique was perfected a year later in March 1988 by Dubois in Paris. With in a year leaders in Europe and United States perfected the technique and are responsible for unprecedented and rapid world wide expansion of the procedure.

The explosive success of laparoscopic cholecystectomy initiated a revolution with in general surgery. At present nearly every abdominal operations has been performed laparoscopically.

The sudden surge of Minimal Access Surgery (MAS) to all fields has prompted to me to take this study.

AIM OF THE STUDY

Our aim of the study is to compare laparoscopic cholecystectomy with that of open cholecystectomy by the following factors.

1. The technique of surgery.
2. Duration of surgery.
3. Post operative morbidity.
4. Analgesic requirement.
5. Antibiotic requirement.
6. Post operative hospital stay.
7. Complications.
8. Resumption of normal diet.
9. Return to normal activity.
10. Cosmesis.

REVIEW OF SURGICAL ANATOMY[1, 2]

GALL BLADDER

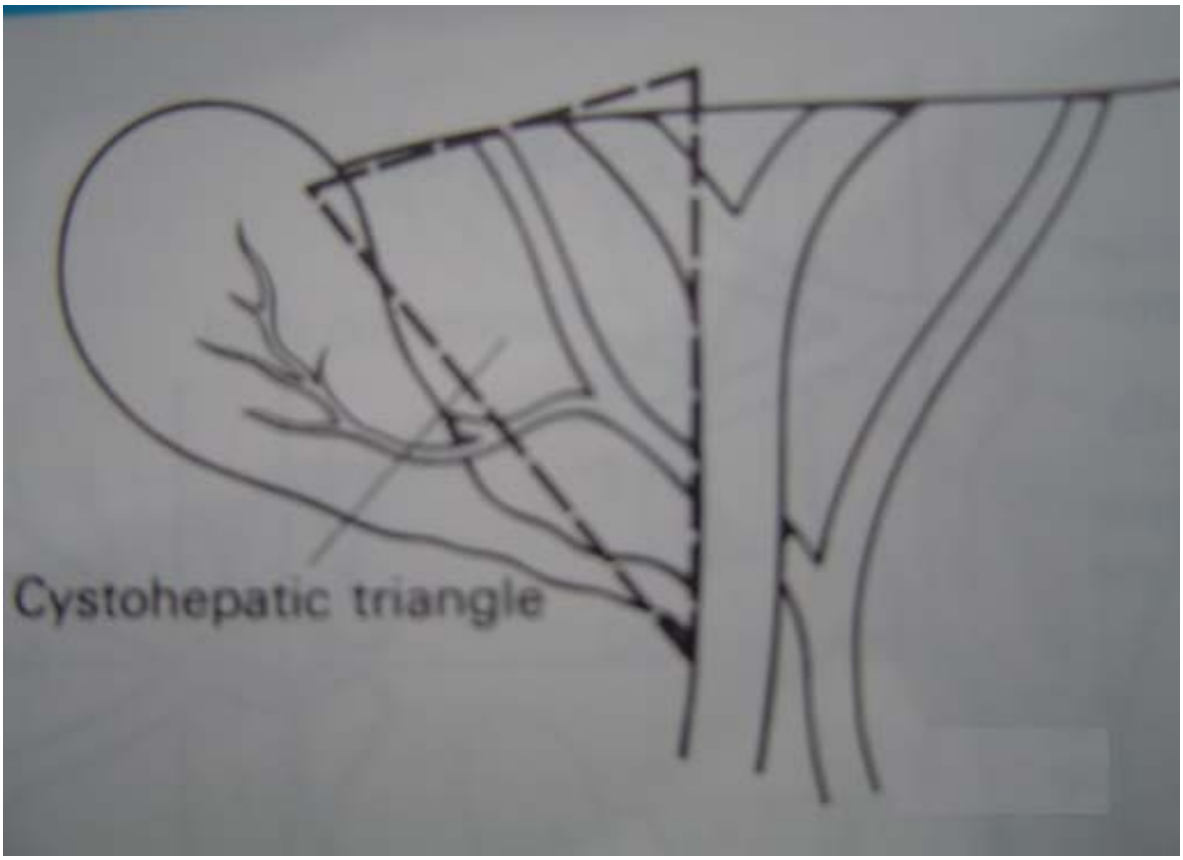
The gall bladder is pear shaped, 7.5-12cm long and a capacity of about 50ml and is situated on the inferior surface of segment V of right lobe of Liver. The anatomical divisions are a fundus, a body and a neck that terminates in a narrow infundibulum. The muscle fiber in the wall of the gall bladder are arranged in criss cross manner, being particularly well developed in its neck. The mucous membrane contains indentation of the mucosa that sinks into the muscle coat, these are crypts of Luschka.

Arterial supply of the gall bladder is critical. The cystic artery, a branch of right hepatic artery, is usually given off behind the common hepatic duct. Venous drainage directly drain into quadrat lobe of Liver or hepatic vein. The lymphatics of gall bladder drain into the cystic lymph node of lund.

CYSTIC DUCT

The cystic duct is about 3cm in length but variable. Its lumen is usually 1-3mm in diameter. The mucosa of the cystic duct is arranged in spiral folds known as the valves of Heister. Its wall is surrounded by a sphincteric structure of Lutkens. While the cystic duct joins the

Cystohepatic triangle of calot



common hepatic duct in its supraduodenal segment in 80 percentage of cases,it may extent down into the retroduodenal or even retropancreatic part of the bile duct before joining. Occasionally, the cystic duct may join the right hepatic duct or even right hepatic sectorial duct.

COMMON BILE DUCT

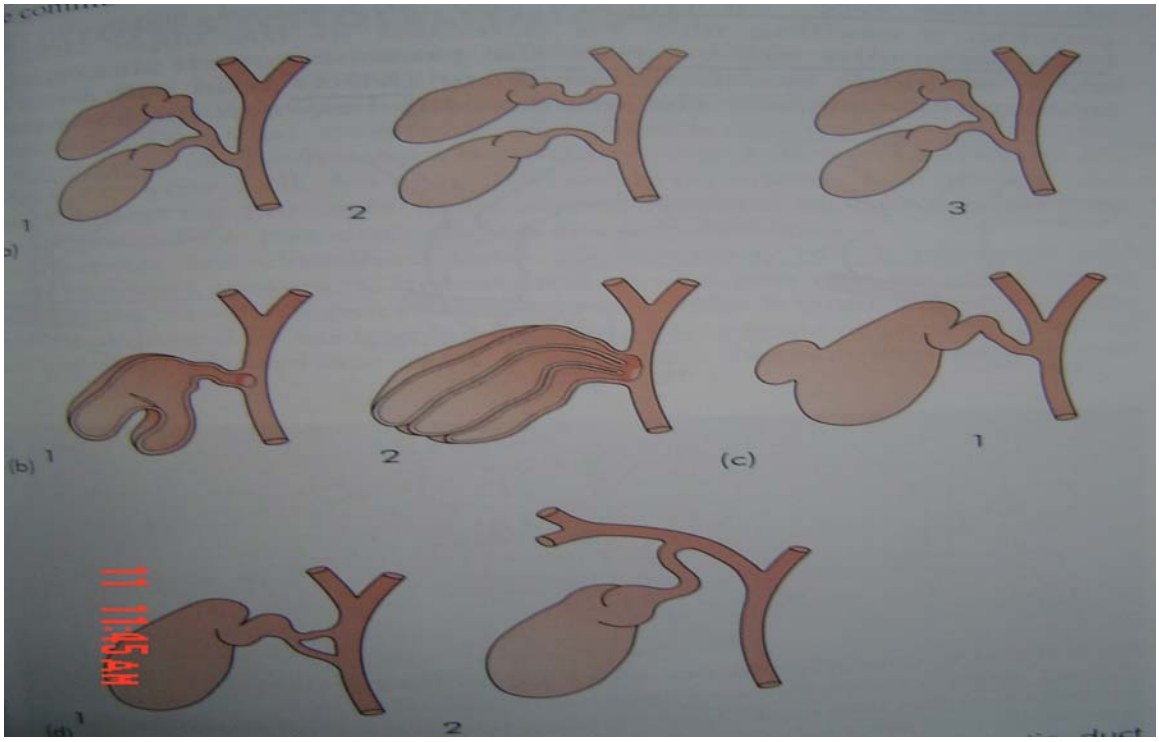
The Common hepatic duct is usually less than 2.5cms long and is formed by the union of right and left hepatic duct. The common bile duct is about 7.5cms long and 6-8mm in diameter. It is formed by the junction of cystic and common hepatic ducts.

CYSTO HEPATIC TRIANGLE OF CALOT

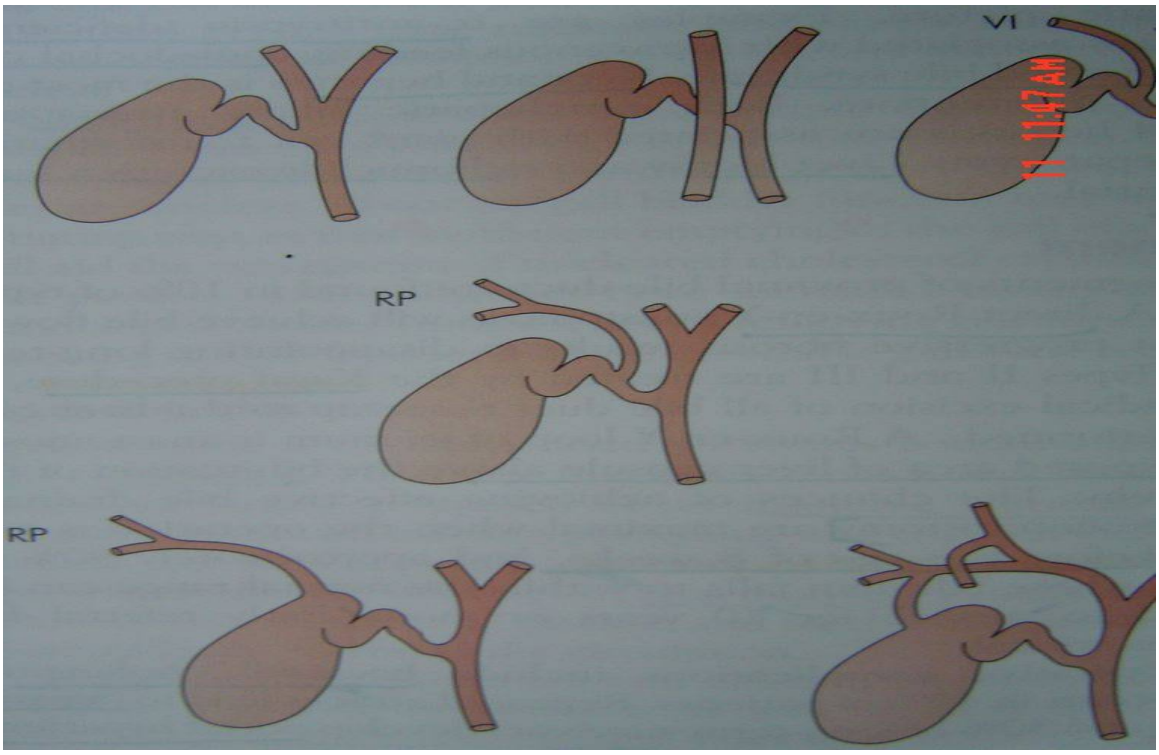
It is formed by the cystic duct and neck of the gall bladder inferiorly, the liver edge superiorly and the common hepatic duct medially. It contains the cystic artery and cystic lymph node of lund and the right hepatic artery as it emerges from behind the common hepatic duct. The vast majority of anomalous bile ducts arise from the right ductal system and 80% are located in the cysto hepatic triangle of calot.

Every surgeon should know the variation in the anatomy of gall bladder, cystic duct and cystic artery.

Anomlies of Gall bladder



Anomlies of Cystic Duct



Anomalies of gall bladder

1. Absence of gall bladder
2. The Phrygian cap
3. Floating gall bladder
4. Double gall bladder
5. Septum of gall bladder
6. Diverticulam of gall bladder

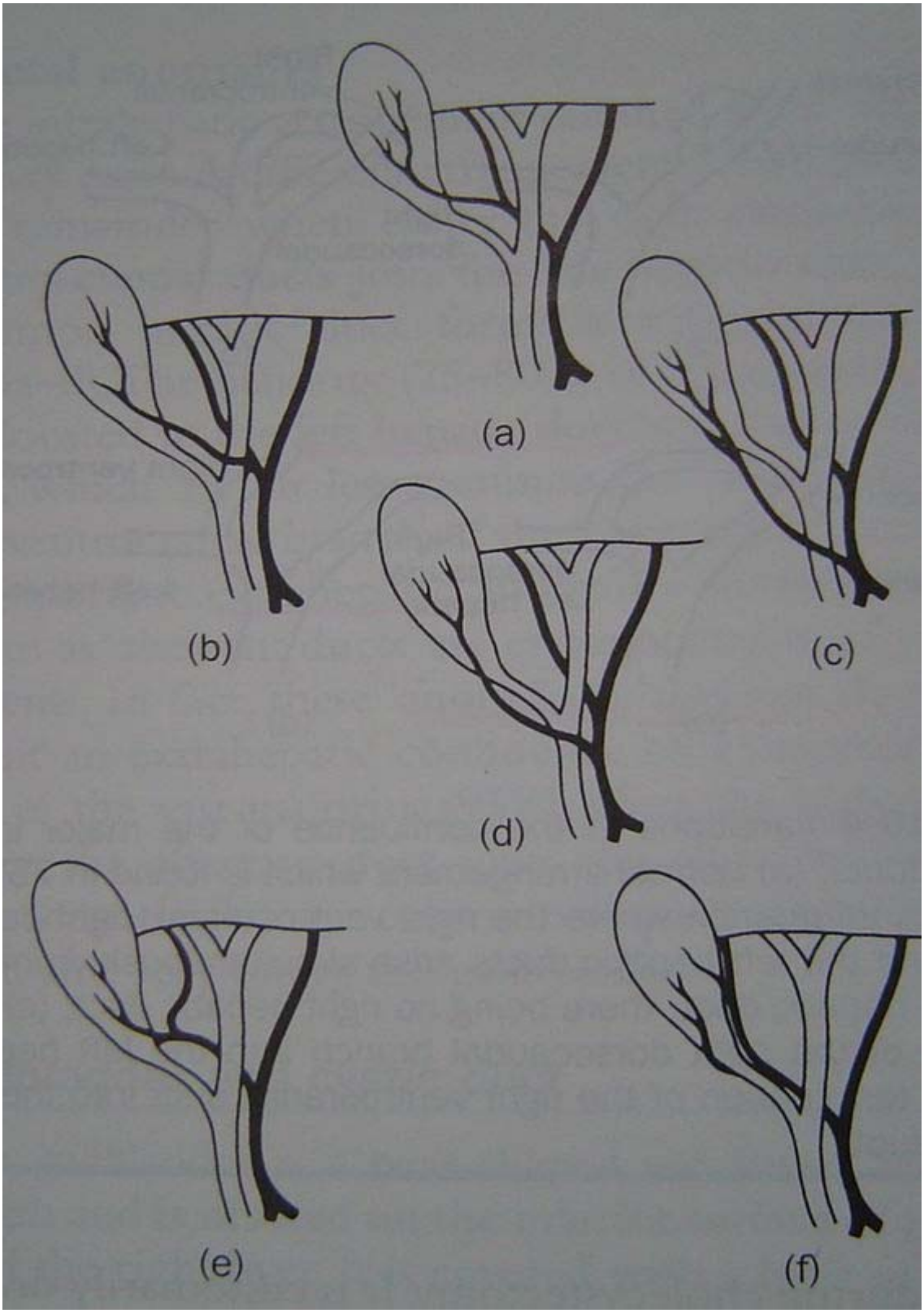
Anomalies of cystic duct

1. Absence of cystic duct
2. Low insertion of cystic duct
3. An accessory of cholecystohepatic duct
4. Segment IV drainage into cystic duct
5. Drainage of right posterior sectorial duct (RP) into the neck of gall bladder.

Anomalies of cystic artery

1. Cystic artery crossing in front of the common hepatic duct.
2. Low origin of cystic artery from common hepatic or gastroduodenal arteries.
3. Accessory cystic artery arising from hepatic artery or gastroduodenal arteries.

Anomlies of cystic artery



4. Tortuous right hepatic artery with a short cystic artery. This most dangerous anomalie is called caterpillar turn or Moyniham`s hump.
5. Right hepatic artery runs close to the cystic duct and neck of gall bladder.

SPECTRUM OF GALLSTONE DISEASE

Gallstones are the most common billiary pathology. In UK, USA and Australia, the prevalence rate varies from 15 to 25%. Male to female ratio 1:2. In India the prevalence rate reported as 2% to 29%. Seven times more common in the North India (stone belt) than in South India. Male to female ratio 1:6.4, Mixed stones are more common in India.[3]

Gallstones can be classified in various ways.[4, 5, 6, 7]

1. Present accepted classification:

   Cholesterol stones, Black pigment & Brown pigment stones.

2. Based on chemical composition:

   Cholestrol stones, pigment stones, mixed stones.

3. Aschoff classification:

   Inflammatory, metabolic, static& mixed stones.

CLINICAL SYNDROMES OF GALLSTONES DISEASE

a. In the gall bladder

1. Silent stones
2. Chornic cholecystitis
3. Acute billiary colic / acute cholecystitis
4. Gangrene
5. Perforation
6. Empyema
7. Mucocele
8. Carcinoma

b. In the bile ducts

1. Obstructive jaundice
2. Cholangitis / septicaemia
3. Acute gallstone pancreatitis
4. Billary fistulous disease

c. In the intestine

1. Gallstone illeus

The current consensus of surgical opinion is that here is no indication for cholecystectomy in the management of patients

with asymptomatic gallstone disease except in the following cases.[5]

i. Diabetic patients.

ii. Calcified gallbladder.

iii. Patients undergoing surgery for other conditions & if patients general condition is good.

iv. Acromegalic patients on long term treatment with somatostatin analogues.

In our study the following group of patients are taken & compared

1. Chronic calculous cholecystitis
2. Cholelithiasis
3. Billiary colic
4. Acute cholecystitis

INDICATION FOR CHOLECYSTECTOMY[6,7]

1. Acute Cholecystitis
2. Chornic Cholecystitis
3. Calculous Cholecystitis
4. Mucocele of gallbladder
5. Emphyema of gallbladder
6. Biliary colic
7. Polyp of gall bladder
8. Carcinoma of gallbladder
9. Perforation of gallbladder
10. Emphysematous Cholecystitis
11. Cholcysto enteric fistula

INVESTIGATION[4,5,6,7]

1. Full blood count , hemoglobin & urine analysis
2. Blood sugar, blood urea
3. Serum creatinine
4. Liver function test:
    - Bilurubin Direct
    - Bilurubin Indirect
    - Alkaline phosphate
    - Aspartate Transaminase
    - Alanine Transaminase
    - Gamma –Glutamyl Transpeptidase
    - Prothrombin Time
    - Albumin
    - Urine Bile Salts and Bile Pigment, Urobilinogen
5. Plain Radiography
    - Radio opaque gall stones in 10% of patients.
    - Porcelain gall bladder –calcification of gall bladder.
6. Ultrasonography
    - Non- invasive
    - Now the standard initial imaging technique for the investigation of the patient suspected of having a gall stone and is also the prime investigation for the patient

presenting with jaundice.

7. Radio isotope scanning

- 99mTcHIDA, PIPIDA

They are excreted in the bile and are used to visualize the billiary tree. In acute cholecystitis the gall bladder is not seen. The technique is used when billiary enteric anastamoses are functioning inadequately as it will show the extent of obstruction at the anastamoses and indicate the delay in excretion.

8. Computerized tomography

- Useful in malignancy

9. Magnetic Resonance Cholangio Pancreatography (MRCP)

- MRCP is the standard technique for the investigation of the billiary tree.

10. Endoscopic Retrograde Cholangio-Pancreatography (ERCP)

- Diagnostic & Therapeutic.

11. Percutaneus Transhepatic Cholangiography(PTC)

- Meglumine iothalamate 60%
- Chiba or okuda needle 15cm long 0.7mm diameter

In addition to diagnostic purpose this technique enables placement of a catheter into the bile ducts to provide external biliary drainage or the insertion of

indewelling stents. Fine flexible choledochoscope can also be passed through the tract to diagnose strictures, take biopsy and remove stones.

Routinely above first six investigations are performed in all patients.

OPEN CHOLECYSTECTOMY

INDICATION:

1. Severe Acute Cholecystitis
2. Emphyema of Gallbladder
3. Gallbladder perforation
4. Chole Cysto Enteritic Fistulae
5. Carcinoma Gallbladder
6. Conversion from Laparoscopic Procedure
7. Emphysematous Cholecystitis
8. Severe COPD with Cholecystitis
9. Cirrhosis with Cholecystitis
10. Portal Hypertension with Cholecystitis
11. Previous Upper Abdominal Surgery with Cholecystitis
12. Pregnancy with Cholecystitis

PROCEDURE: [8, 9, 10]

Anasthesia:

1. General Anaesthesia

Incision:

1. Kocher's sub costal
2. Right paramedian
3. Mayo – Robson(hockey stick)
4. Right upper quadrant transverse
5. Upper midline
6. Mini laparotomy

Steps:

The first step consists in careful packing off. The first pack is placed in the lower part of the wound –displacing duodenum, transverse colon & small intestine downwards. A second pack is placed medially to cover and retract the stomach. A third pack may be inserted laterally to fill the right kidney pouch.

The Retrograde Method (Duct First Method):

A forceps is applied to the infundibulum of the gallbladder and is used to draw the viscus gently forward and to the right. The junction of the cystic and common ducts is now displayed by snipping the overlying peritoneum and by gauze stripping. An absorbable ligature is

now placed loosely around the cystic duct close to the junction with the common duct. Gentle traction on the cystic duct and careful sharp and gauze dissection keeping close to the upper part of the cystic artery. It should be doubly ligated with silk and divided.

The gallbladder is separated from the liver bed by dividing the peritoneal reflection.

Fundus First Method:

This method is advised only when difficulties (particularly severe inflammatory change) prevent the ducts being displayed in the first steps of operation. So separation of gallbladder is commenced at the fundus then the cystic duct and artery are ligated. Wound closed with or without drains.

COMPLICATION

1. Wound infection
2. Intra abdominal abcess
3. Illeus
4. Haemorrage
5. Accumulation of bile
6. Injury to common bile duct and late stricture
7. Injury to right hepatic artery

8. Post cholecystectomy syndrome
9. Venus thrombosis and embolism
10. Portal pyaemia
11. Biliary fistula
12. Adhesive intestinal obstruction
13. Pulmonary complications

LAPAROSCOPIC SURGERY BASICS

SPECTRUM OF LAPROSCOPIC OPERATIONS [11]

GROUP I:

Operations where the laparoscopic approach provides an undoubted benefit and has replaced open intervention cholecystectomy, cardiomyopathy, nerve sections, antireflux surgery, splenectomy, adrenelectomy for nonmalignant tumours and operation for varicocele.

GROUP II:

An operation where the laparoscopic approach appears to be beneficial and safe by more information is needed.

Hernia repair, appendicectomy, adhesiolysis, surgical treatment of duct calculi, segmental colonic resection for diverticular disease or sessilepolpys, rectopexy, enucleation of insulinomas, nephrectomy for benign disease, distal pancreatic resections, oesophagectomy for cancer.

GROUP III:

Operations are currently under evaluation and should not be attempted outside clinical trials.Resection for potentially curable invasive cancer.

GROUP IV:

Unsuitable operations no benefit, increased risk. Pancreatico duodenectomy, D2 resection for carcinoma stomach.

EQUIPMENT: [11, 12, 13]

Image system:

Light sources and light cables

- Xenon
- metal handle (halogen)
- glass fiber bundle
- fluid light cables

Telescopes:

- Rigid viewing type based on Hopkins rod-lens system.
- 10 mm with 0, 30, 45 degree viewing telescopes with insufflating port and an instrumental channel.
- optoelectronic telescopes with CCD.
- CCD (charged couple device cameras).

- Single chip
- Three chip

- Image display system
  - One or two monitors

Devices:

Automatic insufflators

- CO_2 and nitrous oxide
- Pneumo peritoneum pressure 10-12 mm hg
- 4 to 12 l/min flow rate

Instrumentation:

- Veress needle
  - To create pneumo –peritonium by closed method
- Hassan canula
  - To create pneumoperitonium by open method
- Access ports
  - Reusable or disposable
- Grasping forceps
- Angled dissecting forceps
- Scissors

- Clip appliers
- Extraction forceps
- Staplers
- Suction irrigator
- Needle holders

Energy sources:

- Endocoagulators
- Diathermy units
  - Unipolar
  - Bipolar
- Lasers
- Harmonic scalpel
- Ultrasonic dissecting instrument

LAPROSCOPIC CHOLECYSTECTOMY

INDICATIONS AND CONTRAINDICATIONS

INDICATIONS FOR LAPROSCOPIC CHOLECYSTECTOMY: [12, 13]

1. Symptomatic Cholelithiasis
   - Biliary colic
   - Acute cholecystitis
2. Asymptomatic Cholelithiasis
   - Sickle cell disease
   - Total parentral nutrition
   - Chornic immuno suppression
   - Acromegalic patient on stomatostatin treatment
   - Calcified gall bladder
   - Diabetic patient with gall stones
   - Candidates for renal transplant
   - Incidental with other procedures.
3. Acalculous Cholecystitis
4. Gall Stone Pancreatitis
5. Gall bladder polpys

CONTRAINDICATION FOR LAPROSCOPIC CHOLECYSTECTOMY: [12, 13]

Absolute Contraindications

1. Patients unfit for general anaesthesia
2. Significant portal hypertension
3. Gallbladder carcinoma

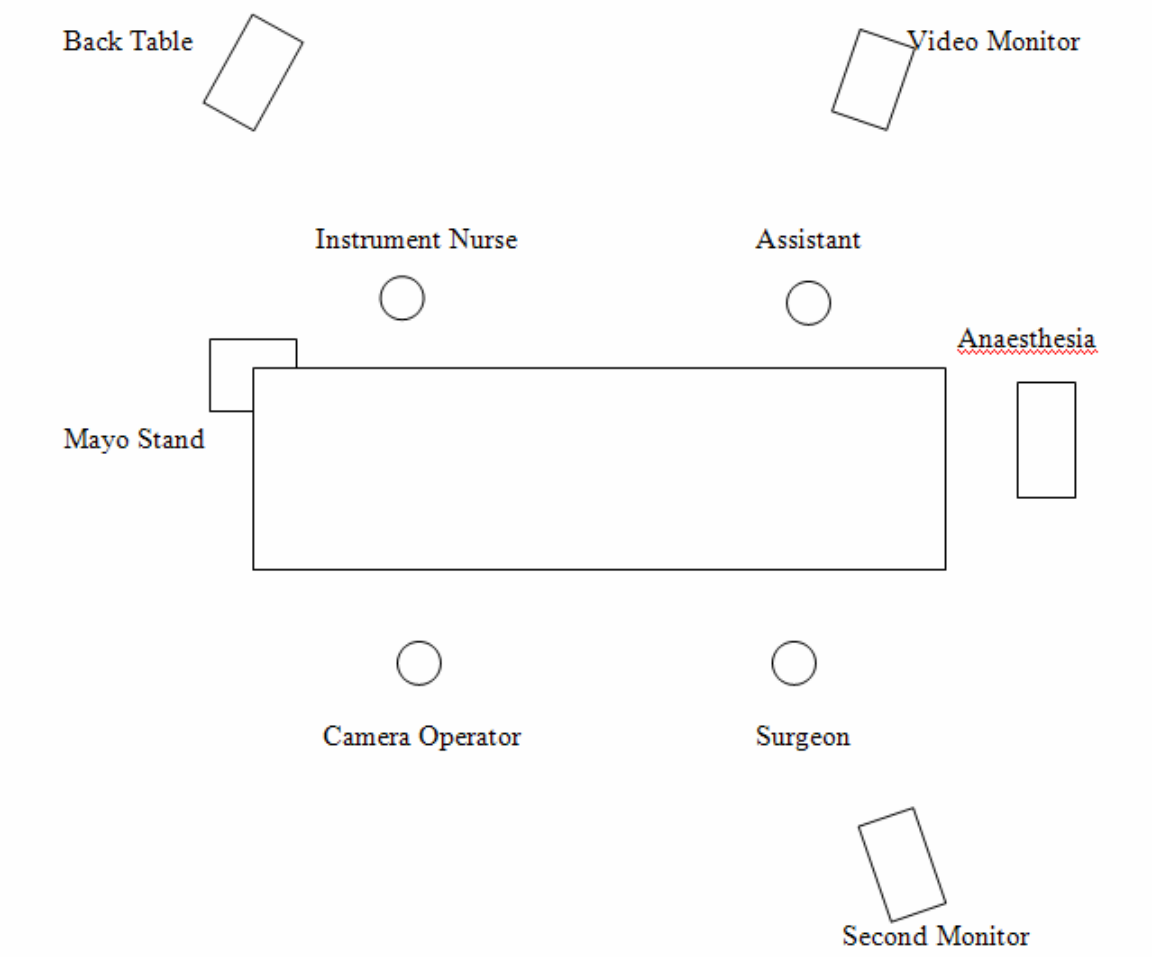
Relative Contraindications

1. Multiple prior operations
2. Acute severe cholecystitis and peritonitis
3. Cirrhotic liver
4. Extensive scarring in calots triangle
5. Acute pancreatitis
6. Abnormal anatomy
7. Pregnancy
8. Morbid obesity
9. Evidence of generalized peritonitis
10. Septic shock from cholangitis.

Pregnancy Should no longer be considered as a contra indication to Lap Cholecystectomy. All Pregnant patients requiring cholecystectomy in 2^{nd} & 3^{rd} trimesters should be offered the advantages of the Lap Cholecystectomy.[14]

LAPAROSCOPIC CHOLECYSTECTOMY

OPERATION ROOM SETUP



OPERATIVE TECHNIQUE [12, 13, 15]

Preparation and Anaesthesia

- ETGA
- Ryles Tube Aspiration
- Bladder Catheterization
- Thrombo Embolic Prophylaxis

Positioning

North American approach, team surgeon and camera assistant stand on the left side of the patient.

First assistant with staff nurse on the right side of the patient. Monitor and instrument trolley on the right side of the patient.

Ports

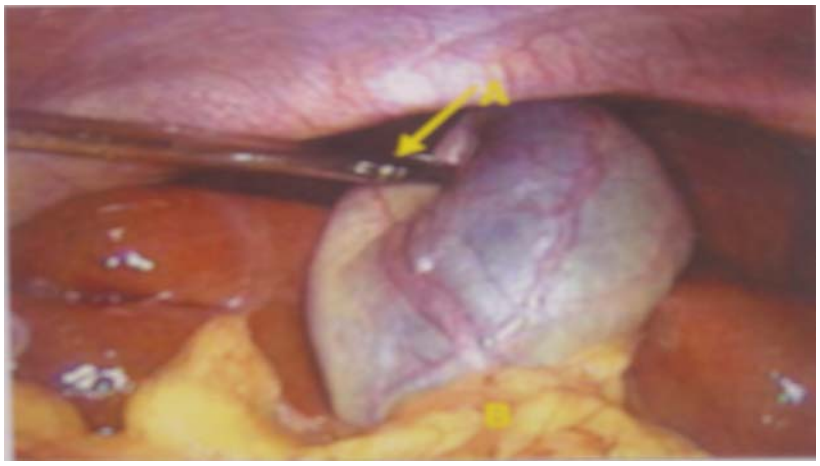
First Port - Umblical 10 mm, camera port.

Second Port - Epigastric 10 mm, working port.

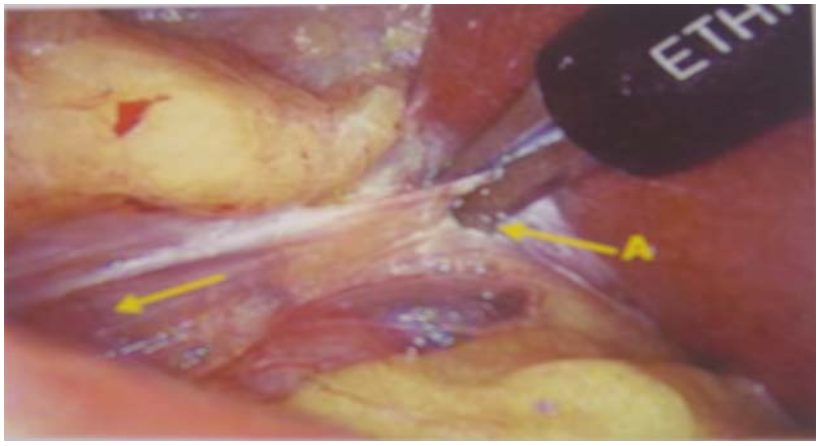
Third Port - Right subcostal port at midclavicular line 5 mm.

Fourth Port - Right lateral port at anterior axillary line 5 mm for retraction of gall bladder.

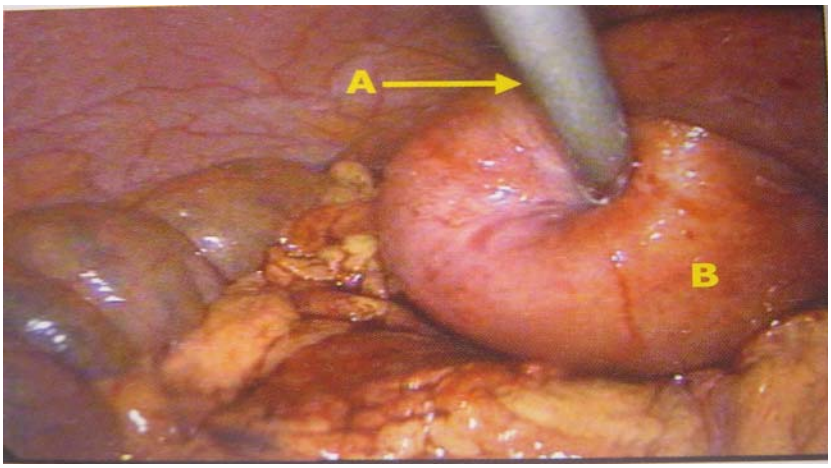
In closed method by using verees needle, a small incision made at the umblicus since it is thinnest portion of abdominal wall and allows easy access. Confirmation of the intraperitoneal location of the needle tip is made by the saline drop test.



A -> Cranial retraction of Gallbladder.
B -> Omental Adhesions.



A -> Division of Adhesions.



A -> Decompression of Gallbladder.
B -> Distended Gallbladder.

Then the peritoneal cavity is insufflated with CO2 at a rate of 4 - 12 lit/min upto 12mm/hg. 10 mm trocar is introduced after the removal of the verees needle. 10 mm laparoscope is introduced and the peritonial cavity is carefully examined. All accessory trocars are placed under vision. The patient is placed in reverse Trendelenburg's position 20 to 30 degree and the table is tilted to left lateral position. The second port and other two 5 mm trocars as mentioned above are inserted.

Exposure of Hilum

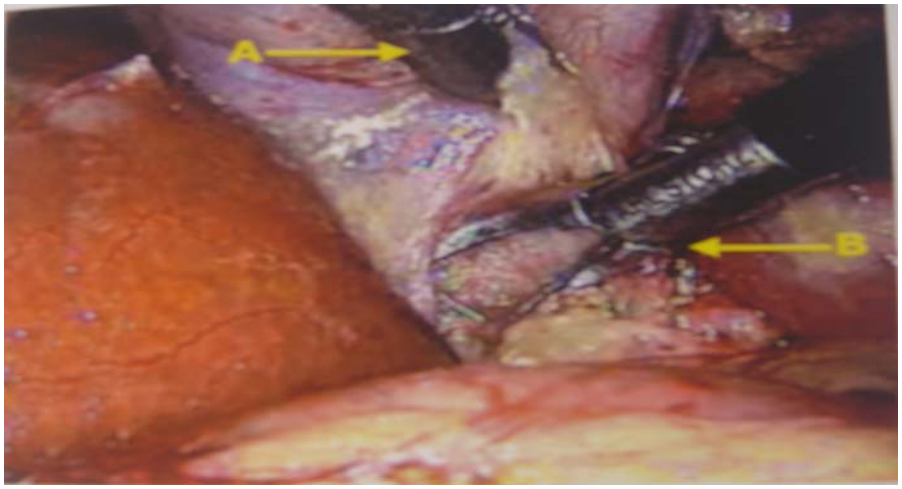
The gall bladder fundus is secured with 5 mm ratchet grasping forceps through right anterior axillary port. Cranial traction of fundus gives adequate exposure of Calot's triangle and hilum.

Adhesion Release

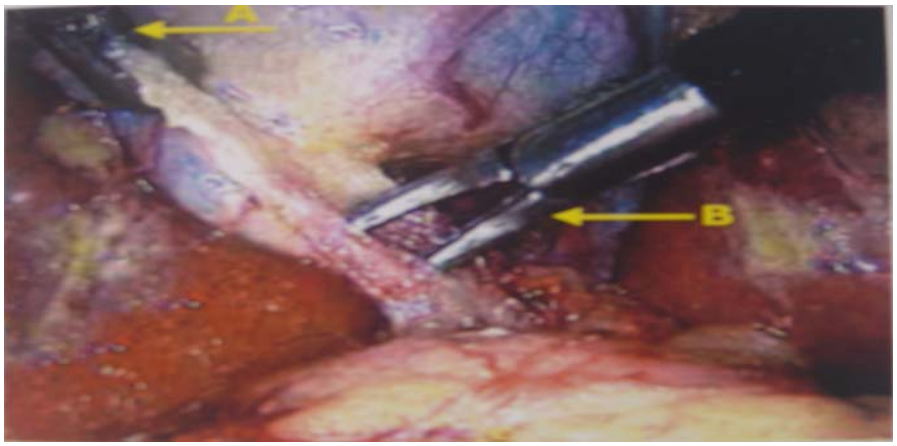
Adhesions over the gall bladder and under surface of Liver are released begining from the fundus using as little cautery as possible.

Preliminary Decompression

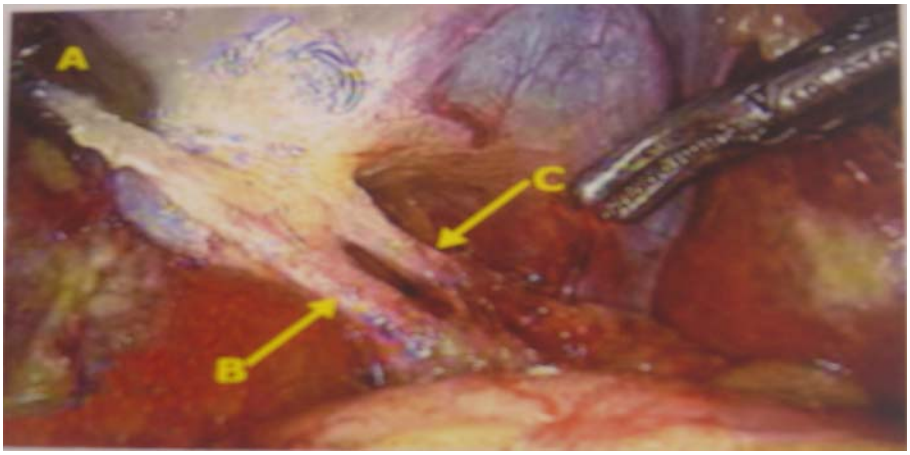
If the gall bladder is tensed and acutely inflammed, preliminary decompression achived by introducing the 5 mm trocar in to the fundus of the gall bladder directly and obtrurator is replaced with the



A -> Exposure of posterior side of Calot's Triangle.
B -> Posterior dissection of Calot's Triangle.



A -> Exposure of anterior side of Calot's Triangle.
B -> Anterior dissection of Calot's Triangle.



A -> Lateral traction of Infundibulum.
B -> Cystic Duct.
C -> Cystic Artery.

suction cannula through the trocar and complete suction of the contents done. Then the trocar is removed from the toothed grasper is placed on the wound of the gall bladder to hold it closed during the cranial traction.

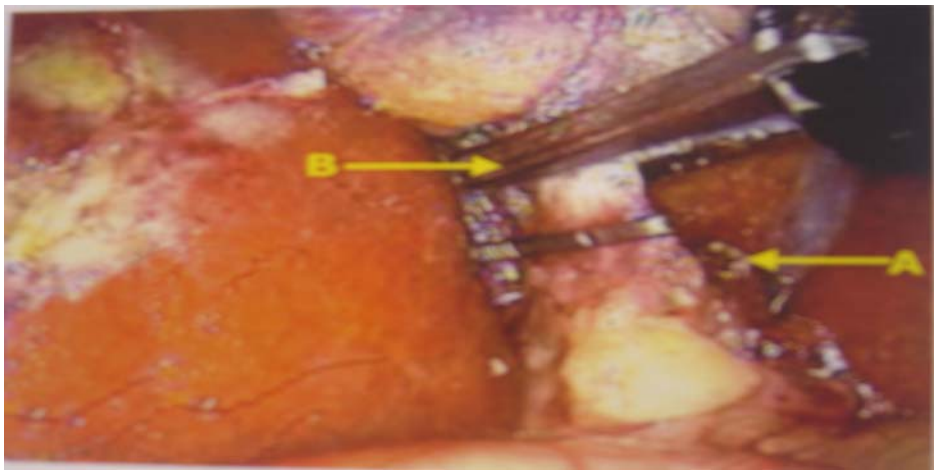
Calot’s Triangle Dissection

An atraumatic grasper is placed through right mid-calavicular port on the Hartmann's pouch. The infundibular grasper is retracted laterally to expose the anterior aspect of the calot's triangle and the peritonium is peeled of then infundibular grasper is retracted anteromedially to expose the posterior aspect of calot's triangle. The junction of the cystic duct with the gall bladder (safety zone) is identified by moving the infundibular grasper backward, forward and side to side.

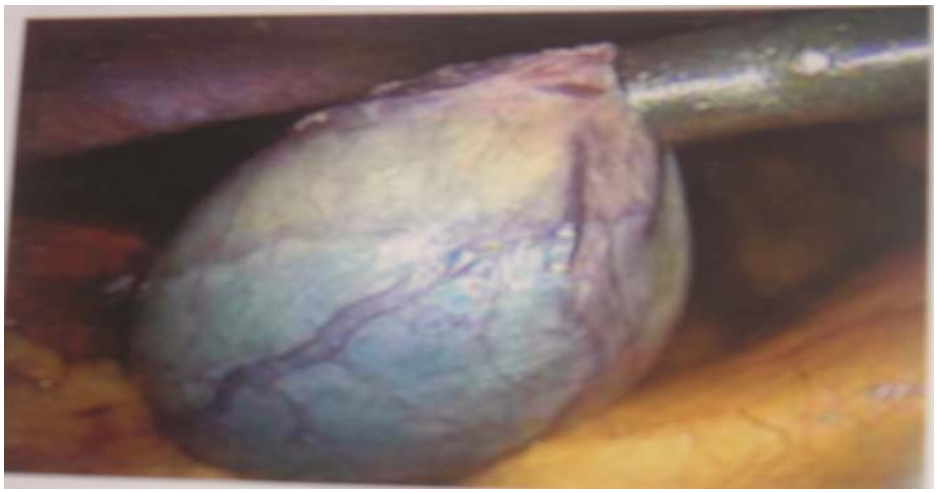
Skeletonisation of Cystic Pedicle

This is done using a curved dissector with the following precautions

- Monopolar electrocautery is commonly used.
- Energy source is not used in close proximity to CBD.
- Minumum electrocautery is used to keep adequate haemostasis.



A -> Divided end of Cyctic Artery.
B -> Cystic Duct.



Extraction of Gallbladder.

A -> Gallbladder
B -> Stones.

- It is not always necessary to identify the cystic and common bile duct junction.
- No arterial structure is assumed to be cystic until it is clearly and unequivocally, shown to pass directly to gall bladder.

Clipping and Division of Cystic Pedicle

Both the cystic duct and artery are clipped, two on the cystic stump side one each close to gall bladder. Blind application of clips in the calot's triangle should be avoided. In some selected situations ducts needs to be divided first to expose the cystic artery. Care is taken in such circumstances not to give excessive traction till the cystic artery is divided.

Dissection of Gallbladder from its bed

Traction and counter traction with right lateral and left medial twist facilitates the dissection. During separation of gall bladder, fundal traction is gradually released down. Prior to complete detachment of gall bladder liver bed is reinspected for adequate haemostasis or bile leakage. Once achieved gall bladder is completely detached and extracted.

Extraction of Gallbladder

Extraction of gallbladder is done through epigastric port. Irrigation of the epigastric port is done in patients with infected gallbladder to prevent port tract infection. A ready vac tube drain or ryles tube drain is kept through lateral axillary port and placed in the sub hepatic space.

The trocars are removed under direct visual control. The ports are closed with vicryl stitches. All the trocar sites are injected with bubivacaine for post operative pain relief.

COMPLICATION OF LAPRASCOPIC CHOLECYSTECTOMY

Intraoperative Complication

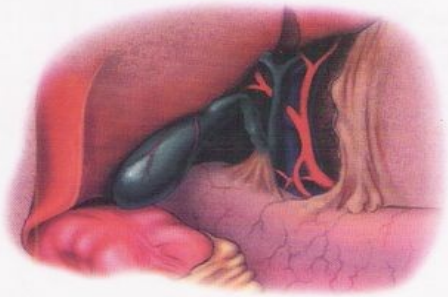
- Haemorrhage – bleeding can occur in various ways.
  - At the site of trocar insertion.
  - During adhesion release from omental vessels.
  - During dissection in the calot's triangle from cystic artery and hepatic artery.
  - From the gall bladder fossa.
- Perforation of gall bladder and contamination of peritoneal cavity with potentially infected bile and gall stones.
- Carcinoma of gall bladder must be recognized preoperatively with a high index of suspicion and if suspected consider for conversion to open procedure

- Bile duct injury.

Postoperative Complications

- Biliary leakage/ biliary fistulae.
- Biliary peritonitis.
- Biliary strictures.
- Diathermy induced thermal injuries to the surrounding structures can occur.
- Omentum or bowel can herniated through the umbilical port site. This can be avoided by suturing the linea alba securely in all cases.
- Port site metastasis can occur if carcinoma gallbladder is not suspected preoperatively.

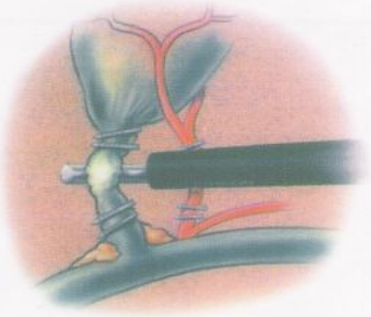
Laparoscopic Cholecystectomy Utilizing the Harmonic Scalpel Curved Blade



When using the Harmonic Curved Blade in a laparoscopic cholecystectomy, no electricity is passed to or through the patient. This offers safer dissection when compared to electrosurgery or laser when working near vital structures such as the common bile duct.

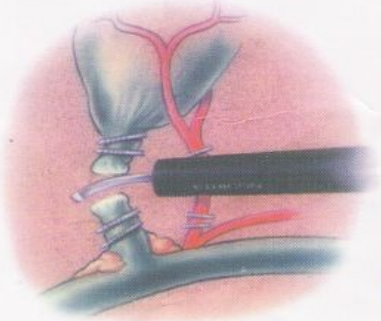
1

To prepare the cystic duct and artery for ligation, the tip of the Curved Blade can be used for blunt dissection and coagulation.



2

The **"Cradle and Cut" Technique** The concave inner surface of the Curved Blade can be used to coagulate the cystic duct and artery.



3

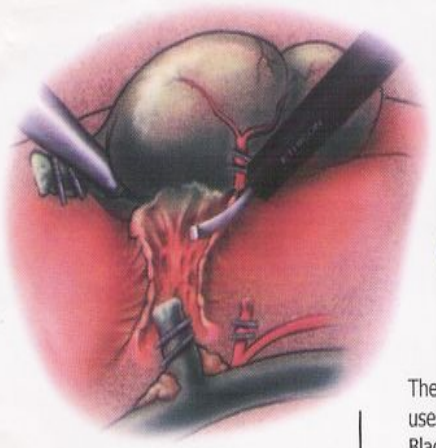
By rotating the Curved Blade 90°, the bilateral cutting surface allows for transection.

RECENT ADVANCES IN LAPARPSCOPIC SURGERY

- Three dimensional Video Systems.
- Image Display System that project image onto a sterile screen overlying the chest of the patient.
- Abdominal Wall Lifting Systems.
  - Rubber Tube Slings Abdominal Wall Lift.
  - Planar Intraperitonial Abdominal Wall Retraction Lift.
- Devices.
  - Harmonic Scalpel Curved Blade.
  - Extra Peritonial Abdominal Wall Lift Devices.
- Robots and Master Slave Manipulators.

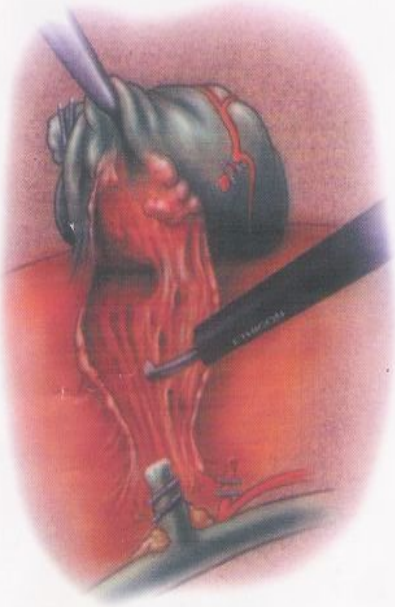
Harmonic Scalpel:

Harmonic is the leading ultrasonic cutting and coagulating surgical device. Harmonic employs ultrasonic energy to achieve precise cutting, cavitation and coagulation. Vibrating 55,500 tiimes/Second, the harmonic blade denatures protein in the tissue to form a sticky coagulum.



4

The **"Bump and Slide" Technique** uses the blunt nose of the Curved Blade for hemostasis and initiating dissection. Use the cutting edges of the Curved Blade to transect the peritoneal attachments of the gall bladder to the liver bed.



5

Either the convex backside or the blunt nose of the Curved Blade can be used to coagulate small bleeders on the liver bed. The lack of char and tissue dissection will be evident.

Some important benefits as follows.

- No Electrical current to or through the patient.
- Minimal lateral thermal damage.
- Greater precision near vital structures.
- Seals blood vessels up to 5 mm diameter.
- Cavitational effect aids in tissue plane dissection.

MATERIALS AND METHODS

Case Selection

In our CMCH we are doing both open and laparoscopic cholecystectomy. This study is done between January 2004 to February 2006. In this period I have selected 25 cases of laparoscopic cholecystectomy to compare with 25 cases of open cholecystectomy. Common indications for surgery were chronic calculous cholecystitis, acalculous cholecystitis, cholelithiasis, biliary colic and acute cholecystitis.

The following factors are compared in laparoscopic and open cholecystectomy

- Technique of surgery
- Duration of surgery
- Post operative pain
- Analgesic requirements
- Duration of antibiotics given
- Intra operative and post-op Complications
- Resumption of normal diet
- Post operative hospital stay
- Return to normal activity
- Cosmesis

CONVERSION TO OPEN METHOD

Procedure was converted to open method in two cases out of 25 patients due to the following reasons.

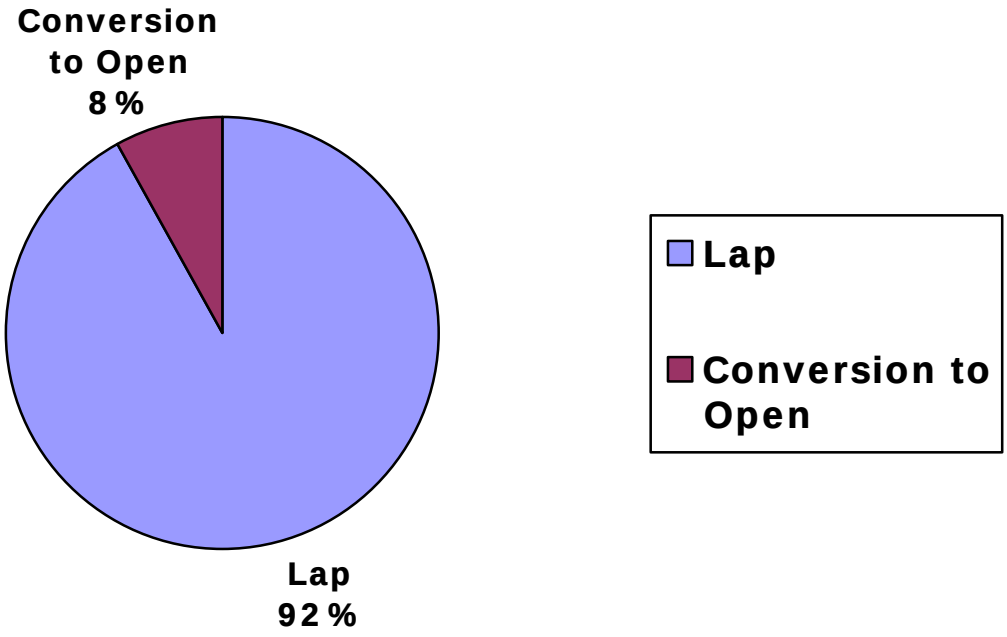
1. In one case there were plenty of thick adhesions between gallbladder and surrounding structures particularly duodenum.
2. In another case there was excessive fat in the calot's triangle and cystic pedicle could not be identified.

Indication for Conversion[16]

1. Inability to identify anatomy.
2. Adhesions.
3. Severe inflammation.
4. Bleeding.
5. Spillage of stones.
6. Impacted cystic duct Stone.
7. Mass near Gall bladder.
8. Injury to Stomach.

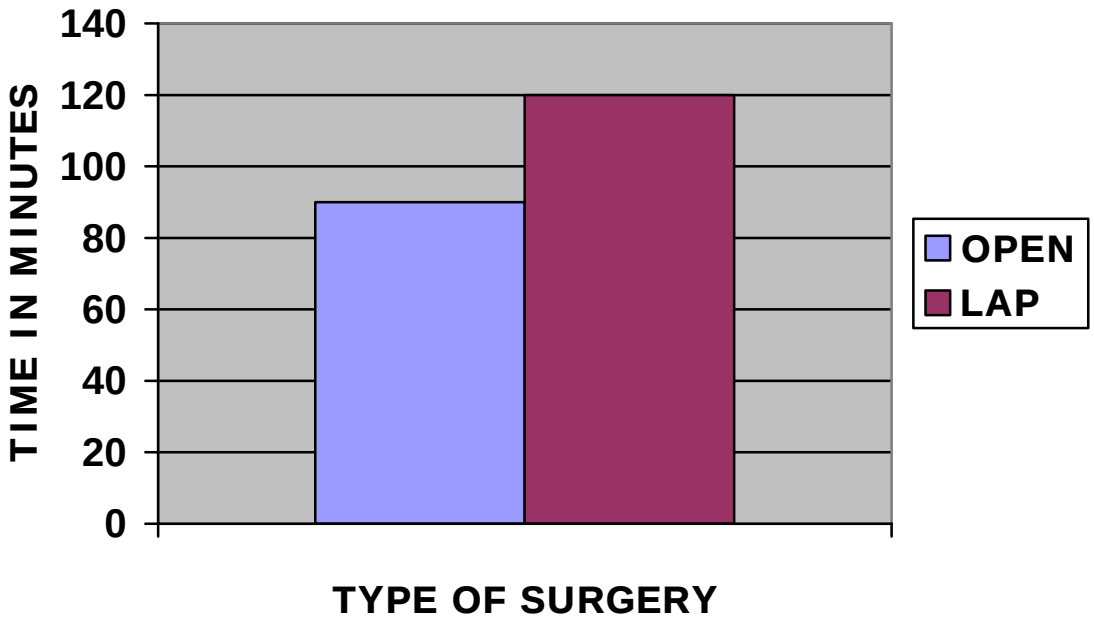
CONVERSION RATE

Conversion Rate - Lap to Open [n=25]



Conversion Rate (%) 8%

DURATION OF SURGERY



Average operating time for Open – 90 min

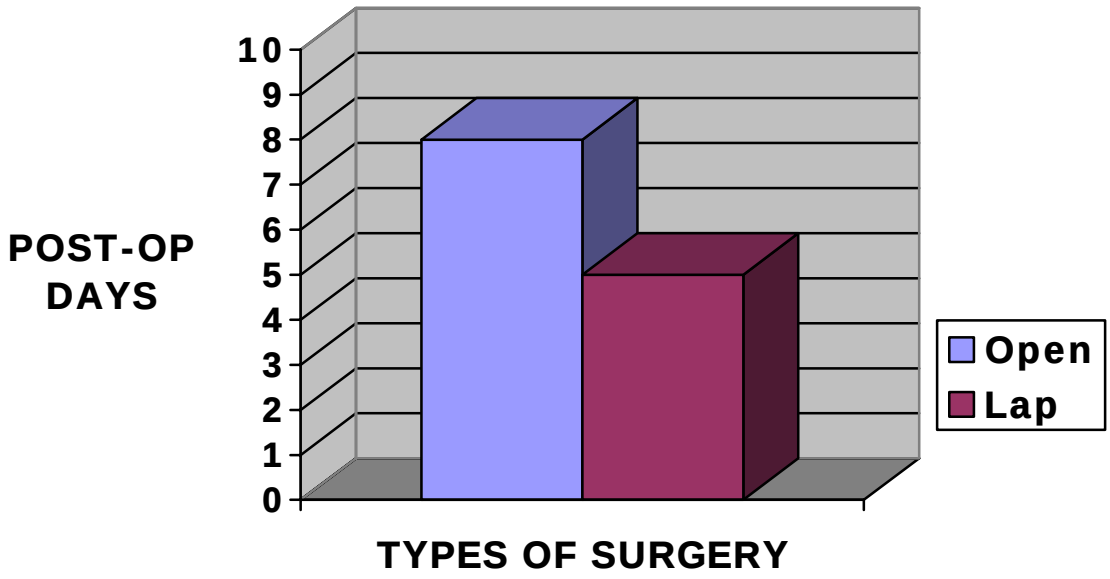
Average operating Time for Lap – 120 min

POST-OPERATIVE PAIN

Number of patients in whom Analgesics required

Post operative day	Open Cholecystectomy	Lap Cholecystectomy
I	25	25
II	25	5
III	20	3
IV	15	-
V	10	-
VI	5	-

DURATION OF ANTIBIOTICS GIVEN



Average Post op antibiotics given for Open Method – 7 Days

Average Post op antibiotics given for Lap Method – 4 Days.

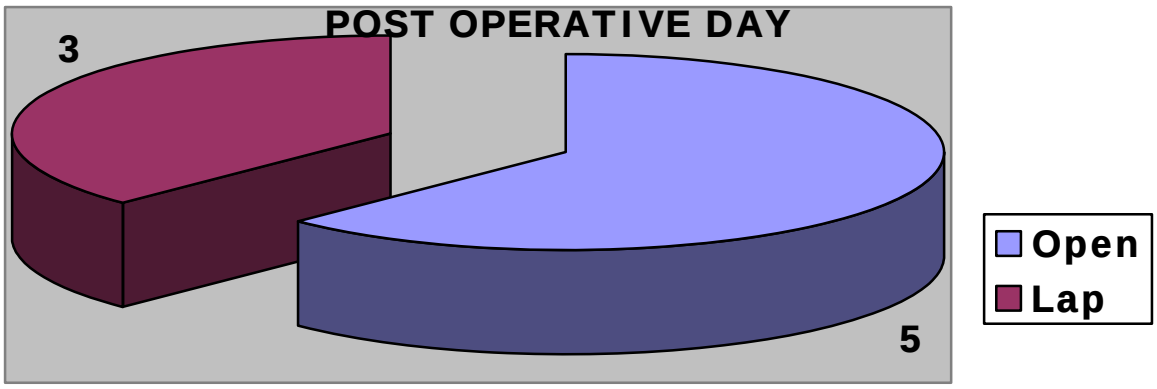
INTRA OPERATIVE COMPLICATIONS

Complications	Open	Laparoscopic
Bleeding	2	1
Bile duct injury	Nil	Nil
Bowel injury	Nil	Nil
Others	Nil	Nil

POST OPERATIVE COMPLICATION

Complications	Open	Laparoscopic
Bleeding	Nil	Nil
Bile leak through drainage	2	1
Wound Infection	3	Nil
Jaundice	Nil	1
Post cholecystectomy syndrome	1	Nil
Pulmonary complications	Nil	Nil

RESUMPTION OF NORMAL DIET

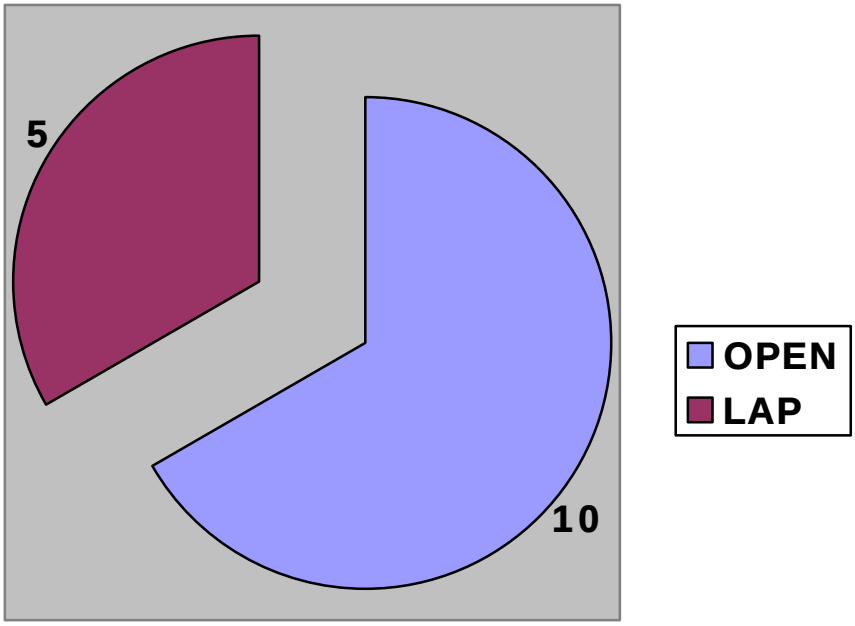


Average Post op resumption of normal diet for Open – 5 Days

Average Post op resumption of normal diet for Lap – 3 Days

HOSPITAL STAY

NO OF DAYS



Average Post op hospital stay for open – 10 Days

Average Post op hospital stay for open – 5 Days

STATISTICAL ANALYSIS

The data are reported as the mean +/- SD or the median (25^{th} to 75^{th} percentiles), depending on their distribution. The differences in quantitative variables between groups were assessed by means of the unpaired t test or the Mann-Whitney test. The chi-square test was used to assess differences in categoric variables between groups. Values of $p<0.05$ were considered to be significant. All statistical analyses were performed using the SPSS software (Version 13.0).

Complications

Intra Operative Complications

Complications	Open (n=25)	(%)	Lap (n=25)	(%)
Bleeding	2	8	1	4
Bile Duct Injury	0	0	0	0
Bowel Injury	0	0	0	0
Others	0	0	0	0
Total	2	**8%**	1	**4%**

Post Operative Complications

Complications	Open (n=25)	(%)	Lap (n=25)	(%)
Bleeding	0	0	0	0
Bile leak through drain	2	8	1	4
Wound Infection	3	12	0	0
Jaundice	0	0	1	4
Post cholecystectomy syndrome	1	4	0	0
Pulmonary complications	0	0	0	0
Total	6	**24%**	2	**8%**

Chi-Square Test

Complications [n=50]	Open cholecystectomy	Laparoscopic cholecystectomy	Total
Intra Operative	2	1	3
Post Operative	6	2	8
Total	8 [16%]	3 [6%]	11
P=0.023 significance between the variables		**chi-dist – 0.7822**	

Clinical details of patients subjected to Laparoscopic or conventional cholecystectomy

Variables	Laparoscopic cholecystectomy (n=25)	Open cholecystectomy (n=25)
Age(years)	42.76 +/- 12.09	39.12 +/- 13.79
Sex ratio(M/F) nos.	7/18	11/14
Duration of Surgery (min)	120 +/- 10.80	90 +/- 13.84
Analgesic requirement (Days)	3.12 +/- 0.33	6.08 +/- 0.40
Antibiotic requirement (Days)	4.28 +/- 0.46	7.40 +/- 1.58
Complications (%) [N=50]	6%	16%
Resumption of Normal Diet (Days)	3.16 +/- 0.85	5.24 +/- 1.23
Post operative Hospital stay (Days)	5.04 +/- 1.34	9.76 +/- 1.23

Values are mean +/- S.D

P<0.005

DISCUSSION OF OUR STUDY

In our study I have selected cases for surgery based on preoperative history, clinical examination, ultrasonography and liver function test. We exclude the common bile duct stones by clinical signs, LFT and ultrasonography.

A study of 25 open cholecystectomy patients of which 18 female and 7 male patients were compared with that of 25 cases of laparoscopic cholecystectomy of which 14 female and 11 male patients.

The relative advantages and disadvantages of laparoscopic and open surgery are measured primarily in terms of quality of life for the patients involved. The study revealed the following findings.

- By technique wise laparoscopic surgery provides better visualization with magnification of surgical anatomy in contrast to the open surgery.
- Among the 25 laparoscopic cholecystectomies, two cases were converted to open cholecystectomy due to adhesions and inability to identify anatomy. Conversion rate was 8%.
- The mean operative time for laparoscopic cholecystectomy is 120 minutes which is 30 minutes longer than conventional open method (90 min).

- Regarding post operative morbidity in terms of pain, recovery from surgery and ambulance from bed the laparoscopic patients faired better from open surgery.
- Traditional major open abdominal operations have potent effects on the immune system. Surgical trauma induces an inflammatory state characterized by the release of proinflammatory cytokines IL-1B, IL-6, IL-8, TNFalpha and acute phase proteins such as C-reactive protein are typically transiently increased. Surgical manipulation also depresses cell mediated immunity by alteration in recruitment, activation and function of circulating lymphocytes, monocytes and other immune cells. After open cholecystectomy, higher post operative plasma levels of CRP, TNFalpha, IL-1B, IL-6 and higher leukocyte counts relative to laparoscopic cholecystectomy.[17] This was the probable reasons for early recovery, less pain and early ambulance in laparoscopic cholecystectomy patients.
- Regarding analgesic requirement the open surgery patients required analgesics even on the sixth post operative day. While the laparoscopic patients didn't experienced pain in the immediate post operative period because of less acute phase reactions and port site

infiltration of bupivacine and no patients required analgesics on the fourth post operative day.

- The mean duration of antibiotics given for open cholecystectomy patients were around 7 days while for laparoscopic patients it was only 4 days.
- Regarding intra operative complications bleeding has occurred in two open cholecystectomy and one open laparoscopic cholecystectomy patients. Bile duct injury was nil in both open and lap cholecystectomy. Regarding post operative complication bile leak through drain has occurred in two open and one lap patients. All the three patients were treated conservatively and subsided, probably reason due to bile leak from the gall bladder bed in the liver. Out of 25 cases of open cholecystectomy 3 cases had got wound infection, but it was nil in lap cholecystectomy. Transient post op jaundice was developed in one lap case. Persistent pain and dyspepsia after cholecystectomy (post cholecystectomy syndrome) occurred in one open cholecystectomy patient. Long term pain less common after laparoscopic than open cholecystectomy.[18] In our study both groups patients there were no pulmonary complications. But other studies revealed impairment in

pulmonary function after lap cholecystectomy was less marked than after open cholecystectomy.[19] The overall complication rate for open method was 16% and for lap only 6%.

- The patients operated by conventional open method resumed to normal diet only on 5th post operative day, while those done by lap method resumed to normal diet even on the 3rd post operative day.
- Regarding post operative study in the hospital, for open method patients it was totally 10 days after surgery, while for lap patients it was only 5 days. The early ambulance and even return to normal activity was quick after lap method, so cost effective.[20]
- Cosmesis is the greatest advantage after lap cholecystectomy compared to open method.

REVIEW OF LITERATURE

Comparison with other studies

1. In our hospital(CMCH) study 2004-2006

Variables	Lap (n=25)	Open (n=25)
Age(years)	42.76	39.12
Sex ratio(M/F) nos.	7/18	11/14
Duration of Surgery (min)	120	90
Analgesic requirement (Days)	3.12	6.08
Antibiotic requirement (Days)	4.28	7.40
Complications (%) [N=50]	6%	16%
Resumption of Normal Diet (Days)	3.16	5.24
Post operative Hospital stay (Days)	5.04	9.76
Coversion rate	8%	

2. U.Berggren et al. 1994 [21]

Variables	Lap	Open
Age(years)	41.4	42.8
Sex ratio(M:F)	5:10	4:8
Operating Time (min)	87	69.2
Hospital stay (days)	1.8	2.8
Sick Leave (days)	11.7	24

3. M.Johansson et al. 2005 [22]

Variables	Lap	Open
Age(years)	53	56
Sex ratio(M:F)	19:16	16:19
Operating Time (min)	90	80
Conversion rate (%)	23	-
Hospital stay (days)	2	2
Sick Leave (days)	11	14

4. P.Helligso et al. 1994 [23]

Variables	Lap
Operating Time(min)	110
Conversion rate(%)	2.8%
Intra operative complications (%)	0.9%
Post op complications (%)	7.1%
Hospital stay (days)	3.5
Time of recovery (days)	12.5

5. Prospective randomized trials of open versus laparoscopic cholecystectomy [24, 25]

Author	No of Pts	Operating Time (min)	Complications (%)	Length of Stays (Days)	Return to work (Days)
Berggrenetal 1994					
OC	12	69	-	3	24
LC	15	87	-	2	12
McMahonetal 1994					
OC(minilap)	148	57	20	4	-

LC	151	71	17	2	-
Majeed Etal 1996 OC(minilap) LC	 100 100	 40 65	 XX XX	 3 3	 35 28
Barkun et al 1992 OC (minilap) LC	 25 37	 73 86	 8.0 2.7	 4 3	 20 12
Trondsen et al 1993 OC LC	 35 35	 50 100	 20 17	 4 3	 34 11
Kiviluoto et al 1998 OC LC	 31 32	 XX -	 23 3	 6 4	 - -

6. Results of large series Laparoscopic Cholecystectomy

Study	No of Pts	Conversions (%)	Mortality (%)	Complications (%)	Bile duct injuries (%)
Fullarton et al (1994)	1683	17.0	0.50	5.9	0.7
Newman et al (1995)	1525	2.2	0.26	4.1	0.0
Southern Surgeons Club (Meyers 1991)	1518	4.7	0.07	1.5	0.5
Cuschieri et al (1991)	1236	3.6	0.00	1.6	0.3
Brune et al (1994)	800	1.2	0.00	2.8	0.2
Perissat et al (1992)	777	5.5	0.10	3.3	0.4
Jatzko et al (1995)	740	5.4	0.14	1.9	-
Cappucino et al (1994)	563	4.8	0.00	6.9	0.3
Soper et al (1998)	1200	2.1	0.10	2.7	0.2

CONCLUSION

In our study the laparoscopic cholecystectomy surpasses the open cholecystectomy by the followings:

- Better visualization and magnification of surgical anatomy.
- Decreased post operative morbidity.
- Shorter duration of analgesic requirements.
- Shorter duration of antibiotic requirements.
- Decreased wound infection.
- Quicker ambulance, better compliance and rapid return to normal activity.
- Rapid resumption of normal diet.
- Shorter post operative hospital stay.
- Best cosmesis.

The only disadvantage is the prolonged operative time, which can be minimized in due course of time as the learning curve progresses.

We have also found that the conversion to open cholecystectomy should be done in proper time with out any hesitation in case of complications that could not be managed by laparoscopic surgery and conversion in such case reflects sound judgment and should not be considered as a complication.

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PROFORMA

1. NAME:
2. AGE/SEX:
3. HOSPITAL NO:
4. OCCUPATION:
5. DATE OF ADMISSION:
6. DATE OF SURGERY:
7. DATE OF DISCHARGE:
8. COMPLAINTS:
9. CLINICAL EXAMINATION:
10. INVESTIGATIONS:
11. DIAGNOSIS:
12. PROCEDURE (OPEN/LAP):
13. OPERATIVE DETAILS:
    - A. Anesthesia
    - B. Duration of surgery
    - C. Co2 used
    - D. Number of ports used
    - E. Findings
    - F. Problems encountered
        - I. Spillage – bile, stones
        - II. Bleeding – cause, source, management

III. Bile duct injury

IV. Others

G. Drainage – used or not

H. Conversions – yes or no, reason

14. POST OPERATIVE PERIOD

A. Pain

B. Analgesic and antibiotics used – drugs, dosage, duration

C. Day of oral feeds

D. Day of drain removal

E. Day of ambulance

F. Day of return to normal diet

15. COMPLICATIONS:

16. HOSPITAL STAY:

17. CONDITION AT DISCHARGE:

18. FOLLOW UP:

MASTER CHART

Open Cholecystectomy Data Sheet								
Sl. No	Patient	Age (Years)	Sex	Duration Of Surgery (min)	Analgesic Requirement (Days)	Antibiotic Requirement (Days)	Resumption of Normal Diet (Days)	Hospital Stay (Days)
1	Amutha	23	F	60	6	6	5	10
2	Krishnaveni	30	F	80	5	7	5	10
3	Pommiammal	50	F	80	6	6	5	12
4	Deivani	25	F	100	6	10	3	10
5	Machakalai	33	M	90	6	6	5	9
6	Junitha	30	F	90	6	7	5	10
7	Rajalakshmi	53	F	110	7	6	5	10
8	Rangaraj	41	M	90	6	6	3	7
9	Suguna	23	F	80	6	11	5	10
10	Kaliyammal	25	F	70	6	6	5	8
11	Sivaraj	23	M	80	6	8	4	10
12	Kandasamy	50	M	100	6	7	5	9
13	Chandrammal	45	F	110	6	8	4	10
14	Krishnan	55	M	90	6	6	5	10
15	Rajeswari	35	F	90	6	12	7	7
16	Rajendran	44	M	110	6	7	5	10
17	Tulasiammal	50	F	60	7	8	8	11
18	Vasantha	25	F	100	6	6	5	8
19	Avamma	40	F	90	6	8	6	12
20	Thamarai Selvi	18	F	110	6	7	5	10
21	Thulasimani	40	F	90	6	7	7	11
22	Chinnasamy	45	M	90	6	8	5	10
23	Sowndammal	40	F	90	6	7	6	10
24	Natchiyammal	65	F	100	7	7	8	10
25	Kamala	70	F	90	6	8	5	10
	AVG	39.12		90	6.08	7.4	5.24	9.76
	SD	13.79		13.84	0.40	1.58	1.23	1.23

Laparoscopic Cholecystectomy Data Sheet								
Sl. No	Patient	Age (Years)	Sex	Duration Of Surgery (min)	Analgesic Requirement (Days)	Antibiotic Requirement (Days)	Resumption of Normal Diet (Days)	Hospital Stay (Days)
1	Mani	58	M	140	3	4	3	4
2	Thulasimani	41	F	120	3	4	4	5
3	Magalingam	53	M	100	3	4	3	5
4	Patturaj	30	M	120	3	5	3	3
5	Jeyaram	42	M	130	4	4	4	5
6	Vambu	55	M	120	3	4	3	5
7	Kavitha	25	F	130	3	5	2	5
8	Pandiyan	28	M	120	3	4	2	4
9	Selvam	34	M	100	3	4	3	3
10	Papathy	62	F	140	4	5	5	5
11	Somasundari	41	F	120	3	4	4	5
12	Jeya	38	F	120	3	4	3	5
13	Panchalingam	55	M	120	3	5	5	4
14	Shanthi	40	F	100	3	4	4	5
15	Sathyabama	45	F	120	3	4	3	3
16	Selvaraj	37	M	130	3	4	2	5
17	Kannammal	36	F	110	3	5	2	6
18	Sunitha	28	F	120	4	4	3	4
19	Valtnammal	60	F	130	3	4	3	8
20	Lakshmi	60	F	110	3	5	4	7
21	Anandha Padmanaban	22	M	120	3	4	3	5
22	Xavier	53	M	120	3	4	3	7
23	Ponnuthai	29	F	110	3	5	2	5
24	Backiyammal	50	F	130	3	4	3	8
25	Anjammal	47	F	120	3	4	3	5
	AVG	42.76		120	3.12	4.28	3.16	5.04
	SD	12.09		10.80	0.33	0.46	0.85	1.34